First record of the invasive red palm mite *Raoiella indica* Hirst (Acari: Tenuipalpidae) in Namibia

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Specimens of a phytophagous mite species, collected during 2015 on the leaves of the date palm *Phoenix dactylifera* (Arecaceae) at two localities in Namibia, were identified as the red palm mite *Raoiella indica* Hirst (Tenuipalpdae). Both locations were on the northern bank of the Gariep River – the farm Eagles Rest, part of Desert Fruit Farms, near Ariamsvlei (coordinates 28°30′340″S 19°341′49′″E), and Karas Date Farming, Karasburg. This is the first time the red palm mite has been recorded from this region and indicates a recent introduction of this economically important and invasive species. It presumably arrived with infested plant material.

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The red palm mite (Fig. 1) was first described from India (Hirst 1924) where it was observed as a pest of the coconut palm *Cocos nucifera* L.(Arecaceae). It has subsequently been reported from various countries in the East and Middle East as a pest of palm trees (Taylor 2015). In Africa, it was first reported from Egypt (1942), followed by Mauritius (1958), Sudan (1960), Kenya (1979, as *R. phoenica*, Beard *et al*. 2013), Réunion (2004), Tanzania (2010) and Benin (2010) (Taylor 2015). In 2004 a major shift in the distribution of the mite took place when the mite was discovered in the Caribbean (Flechtmann & Étienne 2004). From there it spread rapidly to Florida in the U.S.A., Mexico, Brazil and Colombia (Kane *et al*. 2012; Taylor 2015).

Fig. 1. A colony of the red palm mite *Raoiella indica* on leaves of the date palm. (Photograph: A. Jordaan.)

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Long-distance dispersal is probably by means of transported plant material or palm-based handicrafts infested with mites, while local dispersal is by wind and even through inadvertent phoresy on humans (Welbourn 2006).

The mites are bright red and quite small, with the adult female being about 0.30 and the male 0.21 mm long (Hirst 1924). Members of the genus can be recognised, among other characters, by the presence of spatulate dorsal setae (at least the dorsal lateral setae) (Peña *et al*. 2006; Beard *et al*. 2013). The spatulate tips of the setae often hold a drop of liquid (Beard *et al*. 2013; Taylor 2015), which is presumed to be for self-defence. Irregular dark patches, related to feeding, can usually be seen within the bright red body of individual mites. The eggs are orange to red, are very small with a stipe or dorsal slender stalk, which often holds a droplet at the distal end (Kane *et al*. 2012). They are laid as clusters on the lower leaf surface and hatch in 6–9 days (Welbourn 2006). The development time from egg to adult ranges from 20 to 28 days and a female can lay 28 to 38 eggs (Welbourn 2006). The life cycle of *R. indica* was studied by Moutia (1958) on *C. nucifera* in Mauritius, by Zaher *et al.* (1969) on *P. dactylifera* in the United Arab Republic, and by Nageshchandra & Channa-Basavanna (1984) on *C. nucifera* in India. In 2012, a special edition of *Experimental and Applied Acarology*, in which 28 *Raoiella* experts participated, was devoted to the species *R. indica*. In the editorial, Peña *et al*. (2012) expressed the hope that it would provide the basis for more rational control strategies against this pest.

The mites congregate in scattered colonies on the underside of the date palm leaves where they cause localised light brown patches (Fig. 1); they did not concentrate on the midrib as was found by Welbourn (2006) on coconut palms. The colonies characteristically consist of numerous white cast skins and hatched eggs which are retained amongst the red living stages. They feed on the plant tissue *via* the stomata (Beard *et al*. 2012). The low numbers of mites we observed on date palms did not appear to cause damage, but high numbers are known to cause severe damage, particularly to coconuts. In newly infested areas such as the Caribbean, coconut production has decreased by over 70 % and some young plants were killed (Roda *et al.* 2008).

The host range of the mite is quite wide, though it is restricted to monocotyledons. In addition to coconut and date palms, major infestations have been reported on the leaves of banana plants (Musaceae) from some Caribbean islands (Kane & Ochoa 2006). It has also been found on various ornamental plants, including the South African crane flower, *Strelitzia reginae* (Streliziaceae) (Taylor 2015).

Several acaricides have been found to be effective in reducing red palm mite populations (Rodriques & Peña 2012). Many insect and mite predators also provide a degree of biological control, particularly arboreal predatory mites of the family Phytoseiidae. Of these, *Amblyseius largoensis* Muma, has most commonly been found in association with the red palm mite, from Mauritius to the Caribbean and Florida (Taylor 2015). This predator species, in the broad sense (as there are some taxonomic issues with *A. largoensis*), would be of interest to research for possible future introduction as a means of biological control, if it or a relative is not already present in the relevant regions of Namibia. Measures should be taken to contain the mite in the newly infested areas in southern Africa, which are relatively isolated oases in a semi-desert region.

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